



OCTOBER 2009

Plum Brook Reactor Facility Decommissioning Project

10 Years of Progress **PIECE BY PIECE BY PIECE**

NASA began operating the Plum Brook Reactor Facility in 1961, testing the effects of radiation on metals to simulate conditions in space. Then, budget cuts and a change in NASA's program direction resulted in shutting down the Reactor Facility in 1973. The reactor fuel was safely removed and the license with the Nuclear Regulatory Commission (NRC) changed from operating to "possess but do not operate" status. The facility remained sealed and constantly monitored. In 1997, NASA was asked to decommission the facility to the NRC's cleanup level for "unrestricted use". This project cleanup goal means that a person could safely live on the 27 acres, eat crops grown there and drink groundwater from below the site.

NASA submitted a Decommissioning Plan to the NRC in late 1999, describing the monumental course of action that would, piece by piece, dismantle the entire Reactor Facility. During that time, NASA performed pre-decommissioning tasks allowable under the license such as removing loose equipment and preparing overhead cranes that would be needed later on. In March 2002, NASA received NRC approval of the Decommissioning Plan and the work of de-construction began in earnest.

Safety of the workers, the public and the environment has been NASA's top priority throughout decommissioning. NASA's first order of business was reducing the radiation source right at the start to decrease the possibility for exposure during the rest of decommissioning. NASA removed the highly irradiated inventory of equipment from the depths of the hot dry storage vault and the reactor vessel including rods, tubes and activated materials that had been closest to the reactor core during operation.

Reactor segmentation involved removing internal components from above, below and in the core box, cutting the tank into pieces from inside, then packaging and 100% safely shipping the low-level radioactive waste (LLRW) to licensed disposal facilities. By the summer of 2005, 98% of the radioactive inventory that had existed on site at the start of decommissioning had been safely removed.

The remaining low levels of radioactivity were scattered in structures, (concrete surfaces of walls, ceilings and floors), in embedded pipes (underground pipes encased in concrete) and in soil on the 27-acre site. Getting at the last 2% of on-site radioactivity would take some work. Decontamination - a painstaking effort of scouring, scraping and scrubbing - was conducted using high-tech equipment on every surface in every building. Some places were harder than others. For instance, a deep crack in the concrete floor in the Hot Pipe Tunnel required more concrete removal and additional cleaning. In the Reactor Building, it was necessary to remove a layer of asbestos that coated the 25-foot quadrant walls before decontamination could occur. In 2004, when conditions in the embedded pipes were more challenging than expected, NASA halted decontamination, taking time to consider options and test a variety of cleaning approaches. Ultimately, NASA decided to clean, survey and grout the 20,000 feet of embedded piping in place. NASA reached significant milestones in the spring of 2007, successfully decontaminating all seven Hot Cells, and in 2008, decontaminating the Hot Laboratory to meet the project cleanup level. To date, decontamination is complete in all buildings except in portions the Reactor Building, which will take place this winter.

With much of the building cleanup complete, the process of soil decontamination began in the spring 2009. An estimated 100 million pounds of soil is being excavated, assayed (surveyed), and separated into piles - one above cleanup levels to be shipped off site as LLRW, and the other below the cleanup levels to be used again on site as clean fill. Much of the excavated soil comes from cleanup of Pentolite Ditch (cleanup was completed in summer of 2009). Pentolite Ditch was the permitted pathway for water discharges during reactor operations. Traces of Cesium-137 from operations in the past were detected in the clay sediment sampling conducted as part of decommissioning in 2005. At that time, NASA conducted an extensive survey into Plum Brook as far as Sandusky Bay (collecting 2,500 samples) and worked with experts in hydrogeology to fully understand how trace levels of cesium had migrated

over time. The study confirmed there was no public health concern. NASA plans on performing spot cleanup in Plum Brook.

The Final Status Survey (FSS), demonstrating how NASA will reach on-site project cleanup levels at the end of decommissioning was formally approved by the NRC in March 2008. NASA has been busy preparing building interiors (50% done to date) and open land areas for Final Status Survey work. After the site-wide FSS has been completed and the NRC verifies that NASA has met the project cleanup goal, the Reactor Facility license will be terminated (planned for 2011). The buildings that remain will be demolished to 3 feet below ground level and backfilled with clean soil. The area will be restored to an open green field and a safe and thorough decommissioning will be accomplished.

NUMBERS TO NOTE

Over 99% of the original source has been removed from the site

- 10 million pounds of contaminated soil shipped
- 8.5 million pounds of low level radioactive waste (LLRW) shipped
- 6 cask shipments containing 10,022 curies, mostly tritium, to Barnwell, SC
- 1 cask (original control rods) to Nevada Test Site for disposal
- remainder sent to Energy Solutions in Clive, UT

Materials released for recycling

- 5 million pounds of steel
- 400,000 pounds of concrete
- 90,000 pounds of lead

Other

- 5 (in 2009) of 21 (project total) buildings have been demolished
- Workers received less than 1/3 of the expected exposure
- 2 lost work day incidents (minor back strain, ankle sprain) during entire project
- 1,684,586 project work hours (through 9/19/09)

FOR MORE INFORMATION PLEASE CONTACT

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